etching, or plasma etching. The pore volume in the materials can be tuned to achieve different thermal, electrical, optical, and catalytic characteristics in parts of or all of the subsystem.

[0096] The above-described methods can also be used to fabricate other optical components, such as optical absorbers, optical reflectors, optical scatterers, optical splitters, and/or optical diffracters. The manufacturer may also fabricate structures to support the above-described components. For example, in certain embodiments, the manufacturer fabricates grooves or clips for positioning optical fibers that couple with one or more of the components **1112-1119**.

[0097] As mentioned above, the manufacturer may incorporate nanoparticles, nanoporous structures, or small-scale molecular species into the encapsulating layers **1105**, **1107**, **1109**, and **1111**. The incorporation of nanoparticles, nanoporous structures, and molecular species allows a manufacturer to tune the magnetic, electrical, thermal, mechanical and optical properties of the encapsulating layers **1105**, **1107**, **1109**, and **1111**. These materials may be introduced and dispersed into the encapsulating layers prior to the solidifying and crosslinking steps described above. Alternatively, the nanoparticles may be nucleated and precipitated within the encapsulating layer **1105**, **1107**, **1109**, and **1111** materials prior to solidification using common precursor chemistries, such as tetraethylorthosilicate.

[0098] By way of example, the nanoparticles may be ferromagnetic nanoparticles that alter the magnetic properties of the encapsulating layers **1105**, **1107**, **1109**, and **1111**. As mentioned above, the components **1112-1119** may include passive components such as an inductor. In certain embodiments, the manufacturer incorporates nanoparticles that increase the permeability of the device proximal to the inductor and thereby increases the inductance of the inductor. This allows high value inductors, such as inductors with inductances of greater than about 10 nH, to be integrated within the device **1100**. Similarly, the components **1112-1119** may include a capacitor, and the manufacturer can incorporate nanoparticles that increase the permittivity proximal to the capacitor and thereby increase the capacitance of the capacitor.

[0099] The manufacturer can also include nanoparticles to alter the thermal conductivity of portions of the encapsulating layers **1105**, **1107**, **1109**, and **1111**. In certain embodiments, the manufacturer incorporates nanoparticles at preselected locations to increase the thermal conductivity of certain regions of the device **1100** to serve as heat dissipation pathways. Exemplary nanoparticles for this purpose include copper, aluminum, aluminum nitride, and/or silicon. These heat dissipation pathways can be used in addition to or as an alternative to the microfluidic heat dissipation channels mentioned above. In addition to heat dissipation pathways, the manufacturer can dispose thermally insulative nanoparticles in regions of the device **1100** to form heat shields around one or more components **1112-1119** to thermally insulate the one or more components **1112-119** from the rest of the device **1100**.

[0100] Additionally or alternatively, the manufacturer can include nanoparticles to alter the mechanical properties of the device, such as the device's elasticity, strength, or thermal expansion properties. Exemplary materials for this purpose include silicon dioxide, carbon nanotubes, titanium dioxide, and/or aluminum oxide based nanoparticles.

[0101] Other properties that can be altered by incorporating nanoparticles include electrical conductivity, dielectric constant, dielectric loss tangent, absorption coefficient, glass temperature, refractive index, viscosity, and/or Poisson's ratio.

[0102] The above description is not intended to be limiting, and variations on the multi-component device **1000** described above are possible. The multi-component devices consistent with this invention can have functionalities related to any digital, analog, radio frequency, microwave, energy/power source, antenna, micro-electro-mechanical system (MEMS), microfluidic, waveguideoptical, and actuator components. Exemplary applications of such multi-component devices include wireless phones, personal digital assistants, laptops, biotechnology applications such as implantable devices including, but not limited to, defibrillators, pace makers, and glucose monitoring systems, at home diagnostics kits for pathological conditions such as, but not limited to, diabetes, viruses, cardiac disease/failure, and/or clinical diagnostics for high throughput drug screening and/or drug discovery.

[0103] The invention may be embodied in other specific forms without departing form the spirit or essential characteristics thereof. The foregoing embodiments are therefore to be considered in all respects illustrative, rather than limiting of the invention.

What is claimed:

1. A method of forming a device, comprising:

providing a substrate,

coupling a first set of components to the substrate,

encapsulating the first set of components in a first encapsulating layer,

coupling a second set of components to the first set of components, wherein the second set of components are predefined,

encapsulating the second set of components in a second encapsulating layer subsequent to coupling the second set of components, and

functionally interconnecting at least one component of the second set of components with at least one component of the first set of components.

2. The method of claim **1**, wherein at least one of coupling the first set of components and coupling the second set of components comprises coupling an integrated circuit die.

3. The method of claim **1**, wherein at least one of coupling the first set of components and coupling the second set of components comprises coupling components for wireless communication.

4. The method of claim **3**, wherein coupling components for wireless communication comprises coupling at least one of amplifiers, monolithic microwave integrated circuits, synthesizers, and vocoders.

5. The method of claim **3**, wherein coupling components for wireless communication comprises coupling at least one of gallium arsenide components and silicon components.

6. The method of claim **1**, wherein at least one of coupling the first set of components and coupling the second set of components comprises coupling optical signal processors.

7. The method of claim **1**, wherein at least one of coupling the first set of components and coupling the second set of components comprises coupling a sensor.

8. The method of claim **7**, further comprising detecting, by the sensor, the presence of a preselected chemical composition in the fluid sample.